CORAL TRIANGLE INITIATIVE
ON CORAL REEFS, FISHERIES AND FOOD SECURITY

PAPUA NEW GUINEA

IABAM & PAHILELE COMMUNITY BASED RESOURCE MONITORING PROGRAM SURVEY REPORT #: 2

MONITORING PERIOD: MARCH 2011

June 2013

This publication was prepared for Papua New Guinea's National Coordinating Committee and the Iabam/Pahilele Community Manage Marine Area with funding from the United States Agency for International Development's Coral Triangle Support Partnership (CTSP).

Iabam & Pahilele Community Based Resource Monitoring Program
Survey Report #: 2
Monitoring Period: March 2011

AUTHOR:
Jameson Solipo

EDITOR:
Noel Wangunu

USAID PROJECT NUMBER: GCP LWA Award # LAG-A-00-99-00048-00

CITATION: Solipo, J., and N. Wangunu. *Iabam & Pahilele Community Based Resource Monitoring Program, Survey Report #: 2, Monitoring Period: March 2011*. Honolulu, HI: The USAID Coral Triangle Support Partnership, 2011. Print.

PRINTED IN: Honolulu, Hawaii, USA, June 2013

This is a publication of the Coral Triangle Initiative on Corals, Fisheries and Food Security (CTI-CFF). Funding for the preparation of this document was provided by the USAID-funded Coral Triangle Support Partnership (CTSP). CTSP is a consortium led by the World Wildlife Fund, The Nature Conservancy, and Conservation International with funding support from the United States Agency for International Development's Regional Asia Program.

For more information on the Coral Triangle Initiative, please contact:

Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security Interim-Regional Secretariat
Ministry of Marine Affairs and Fisheries of the Republic of Indonesia
Mina Bahari Building II, 17th Floor
Jalan Medan Merdeka Timur No. 16
Jakarta Pusat 10110, Indonesia
www.coraltriangleinitiative.org

CTI-CFF National Coordinating Committee

Ms. Kay Kalim
Deputy Secretary
Sustainable Environment Programs Wing
Department of Environment and Conservation
1st Floor, Bemobile Building
National Capital District, Port Moresby, Papua New Guinea

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IABAM –PAHILELE COMMUNITY BASED RESOURCE MONITORING PROGRAM

SURVEY REPORT No. 2
MONITORING PERIOD: MARCH 2011

A small feeding aggregation of Orangespot surgeonfish (Acanthurus olivaceus) feeding on benthic micro-algae deposits at Dana Gedu (NT. 3)

MONITORING REPORT WRITTEN BY
Jameson Solipo (*Iabam-Pahilele CMMA Data Specialist*) and Edited by NOEL WANGUNU (*Conservation International*)

1. INTRODUCTION

The Iabam-Pahilele community managed marine area (IPCMMA) has successfully completed its first resource monitoring program for 2011 in March and this report presents their findings. Resource assessment and monitoring was done on the same 12 permanent monitoring stations (i.e. 6 inside and 6 outside no-take, conservation areas). All monitoring was conducted by the trained local monitors with supervision from Conservation International staff and its village engagement team (VETs).

During this survey, deepwater permanent stations for fish and invertebrates were also placed at different locations inside no-take and also on open fishing areas, outside no-take. The main purpose for these deep water monitoring stations is to determine population density and to observe vertical movements of large predatory, herbivory and pelagic species in the area. Population of sea cucumber was also observed, making comparison to species distribution with shallow water results. Most of the deepwater transacts have been placed with the use of SCUBA and was undertaken by qualified SCUBA divers. The deepwater monitoring stations will at present be monitored by CI while the shallow monitoring stations be monitored by local communities. In the long run, it is anticipated that some of the local monitoring will be trained to also do monitoring for the deepwater transacts. Findings from the deep water survey are not presented in this report but, will be provided as an independent report a little later.

2. METHODS

2.1. Field Data collection

Resource monitoring methods used during this monitoring are the same as the methods described in the first monitoring period. Most of the methods used have been adopted from the methods used by the Australian Institute of Marine Science (AIMS) and described by English et al. (1997). The use of indicators for fish, clam and sea cucumber have been altered and tailored to suit the need for information and understanding of resources for the people of Iabam and Pahilele Islands. For further information on the actually survey protocol, please consult our monitoring report No. 1 or refer to the survey manual by Wangunu 2010.

Monitoring program was executed by trained members of Iabam and Pahilele Islands with logistic and financial assistance from Conservation International and Nuakata, Iabam-Pahilele Community Managed Marine Area (NIPCMMA) committees.

Our monitoring stations located inside the no-take (conservation areas) and those outside in open fish/access areas is provided in the table below.

Table 1 Monitoring sites located inside the no-take, conservation zone and sites outside of conservation zones

Reef Code	Reefs inside Conservation Area (No-Take Zone)	Reef Code	Reefs outside conservation (no-take areas)
NT.01	Tawali Namonamo	**OT.01**	Iabam (NW)
NT.02	Luluwalagena	**OT.02**	Iabam (SE)
NT.03.	Dana Gedu	**OT.03**	Pahilele (SE)
NT.04	Siasialina	**OT.04**	Tawali Balabala
NT.05	Hanakubakuba Island	**OT.05**	Manikutu
NT.06	Banibani Siga	**OT.06**	Kiwakiwalina

Equipments and logistics used by the Nuakata Monitoring Team Include;

1. 1 x dinghy (40hsp)
2. 8 x set of snorkeling gears (kept by CI-Alotau Office)
3. 1 x GPS (recording coordinates for transacts)

4. 1 x 100 meter fiber glass tape measure
5. 2 x Underwater Digital Camera (kept by CI-Alotau Office)

2.2. Data Analysis

All raw field data collected in March were pre-analyzed and entered into printout copies of the electronic data base (see picture below) which these data was later transferred to the electronic spreadsheet database kept at CI Alotau Office.

Printout version of electronic database

RK	DCR	SG	S
85	17	0	4
14	127	0	7
11	104	0	9
50	70	0	11
134	37	0	19
24	152	0	12
150	7	0	3
105	36	0	6
39	41	0	53
29	88	3	10
15	68	0	17
62	18	0	25
56	52	0	39
23	20	0	19
44	38	0	11
30	12	28	0
RK	DCR	SG	S
87	11	0	25

Monitoring Period: December 2010

NT.1

Analysis: Tally of individual substrate

	Total		Total
BC	19	SC	8
TC	1	SP	0
MC	8	MA	12
FC	4	RK	85
EC	6	DCR	17
SMC	26	SG	0
DC	7	S	4
DDC	3	DD	0
Total substrate cover			200

Percentage Calculation

BC	9.5	SC	4
TC	0.5	SP	0
MC	4	MA	6
FC	2	RK	42.5
EC	3	DCR	8.5
SMC	13	SG	0
DC	3.5	S	2
DDC	1.5	DD	0

NT.2

Analysis: Tally of individual substrate

	Total		Total
BC	25	SC	0
TC	0	SP	0
MC	0	MA	2
FC	0	RK	14
EC	0	DCR	127
SMC	0	SG	0
DC	0	S	7
DDC	25	DD	0
Total substrate cover			200

Percentage Calculation

BC	12.5	SC	0
TC	0	SP	0
MC	0	MA	1
FC	0	RK	7
EC	0	DCR	63.5
SMC	0	SG	0
DC	0	S	3.5
DDC	12.5	DD	0

NT.3

Analysis: Tally of in

	Total
BC	21
TC	0
MC	6
FC	0
EC	4
SMC	0
DC	0
DDC	28
Total substrate cover	

Percentage Calcula

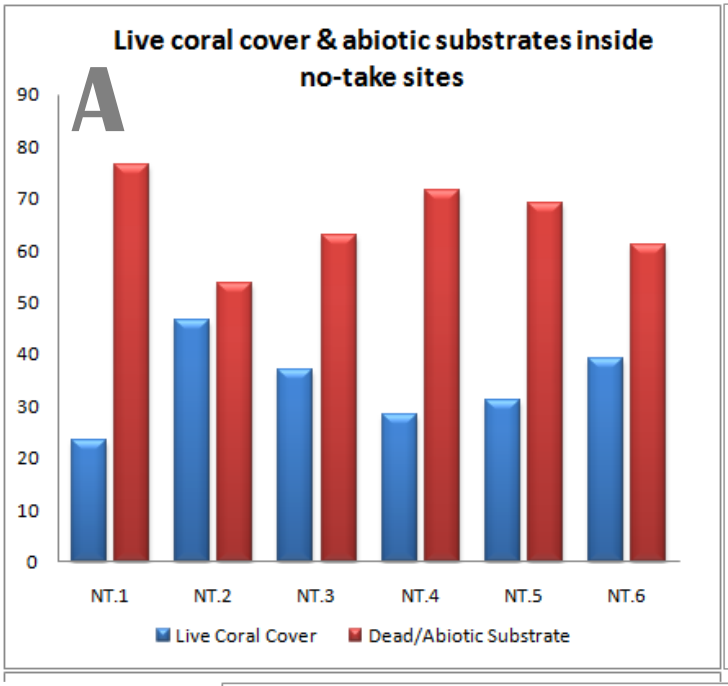
BC	10.5
TC	0
MC	3
FC	0
EC	2
SMC	0
DC	0
DDC	14

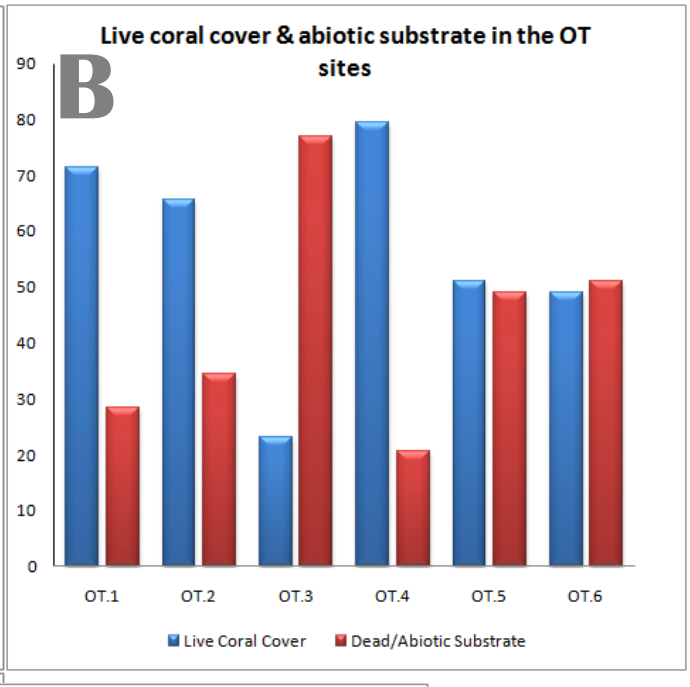
Local data officer Mr. Solipo processing raw data at Iabam Island (top left) and doing data entry and report writing in Alotau (below right)

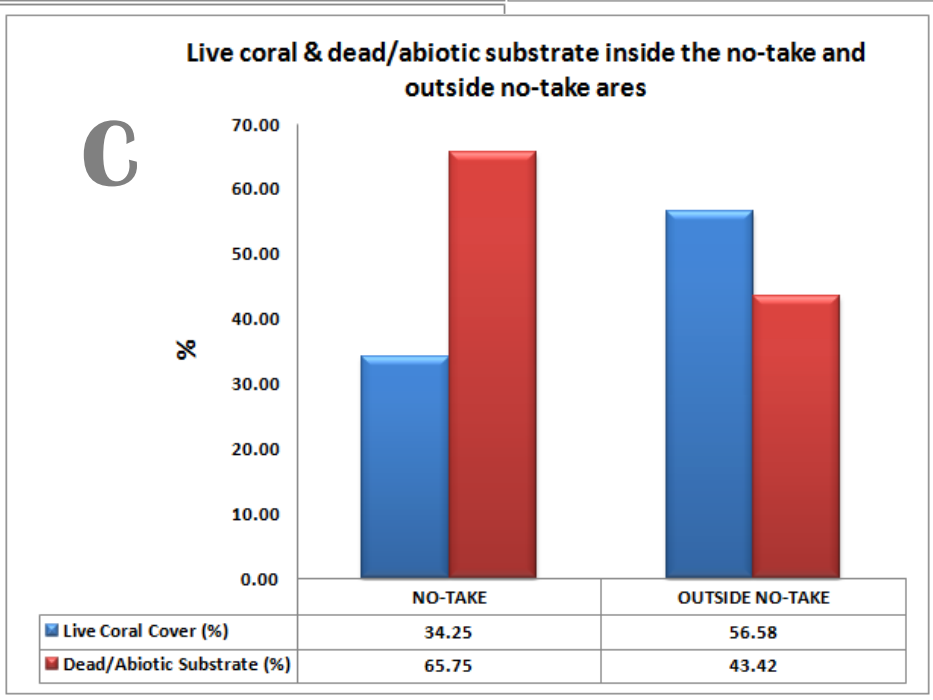
Data were analyzed following a data analysis protocol developed by (Wangunu 2011). Results generated during the analysis were then transferred to this MS Word document, forming the result section of this report.

3. RESULTS

3.1. Benthic substrate for reefs inside no-take and reefs outside no-take areas.







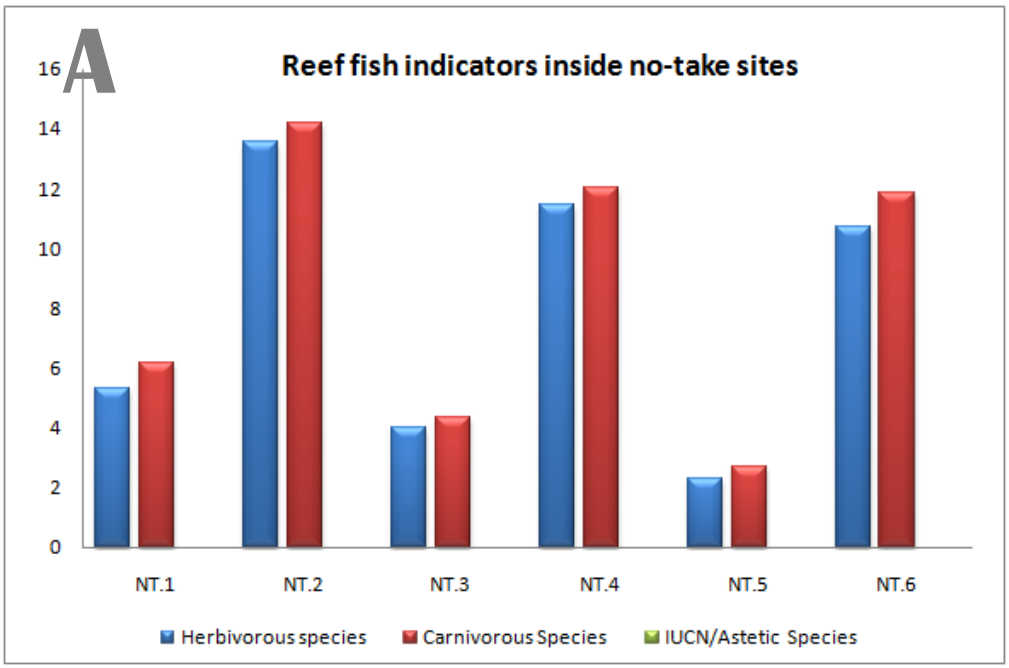
Graph A: *Amount of live coral cover was less for many or all of the sites located inside the no-take, conservation zone. Live coral cover was recorded average for Luluwalagena (NT.2) with (%), Dana Gedu (NT.3) with (%) and Banibani Siga (NT.6) having (%). All other areas had low percent or low amount of coral cover. Tawali Namonamo (NT. 1) comprised 76%, Siasialina (NT.4) contained 71.5% and Hanakubakuba (NT.5) also had 69% of abiotic substrate. The substrate lining the bottom of Tawali Namonamo was purely hard bedrock (46%) with very isolated patches of coral growth while the monitoring station at Siasialina (NT.4) had a lot of broken coral rubble (34%) and the monitoring station at Hanakubakuba also had a lot of coral rubble (41%) compared to live coral*

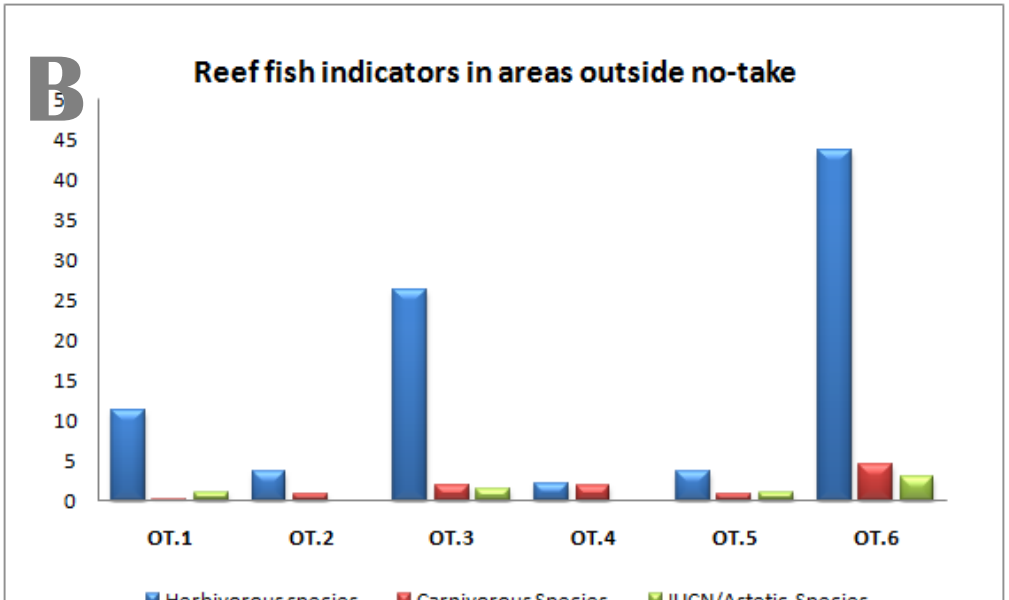
cover. These individual abiotic substrates contributed to the sites having high abiotic substrate and less coral cover.

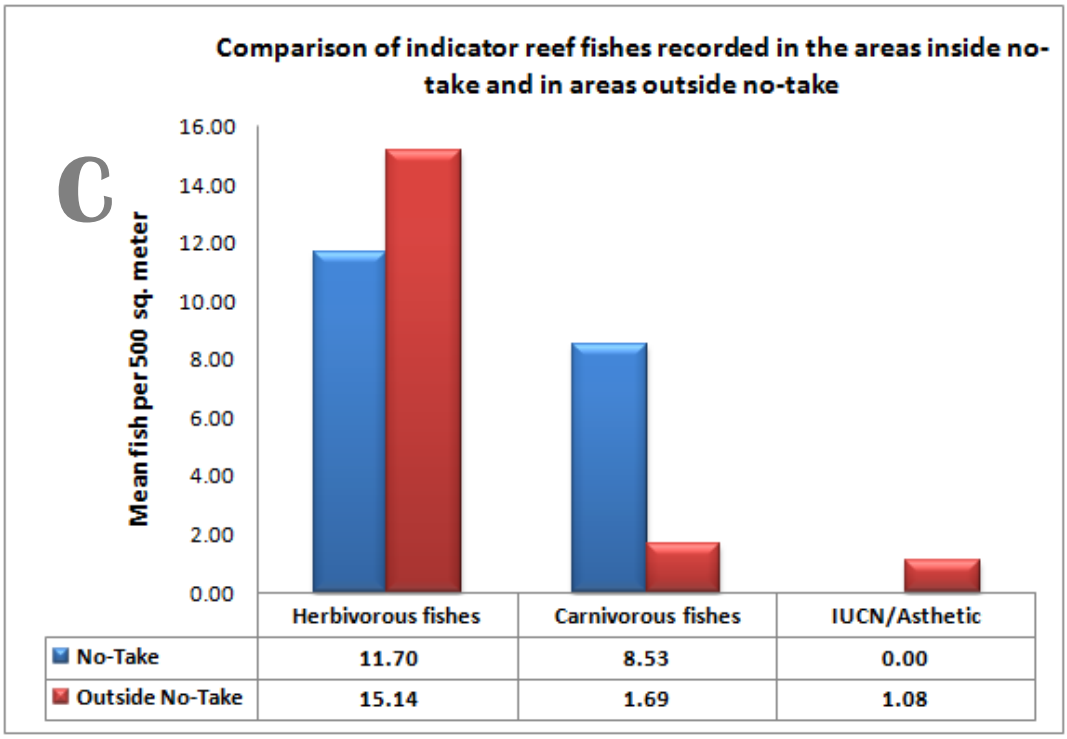
Graph B: *All reefs that were located in the areas outside of no-take had very good coral cover. Tawali Balabala (OT.4) had an outstanding coral cover of 79% live coral cover, Iabam north-west (OT.1) having 71.5% live coral cover and the southern fringing reef of Iabam (OT.2) also had high coral cover. All other sites also had coral cover of over 45%. The only site with low cover was the south east off Pahilele Island (OT.4) which had a cover of 23%. The high coral cover dominance seen at Tawali Balabala was from branching staghorn corals contributing 72.5%; northwestern end of Iabam (OT.1) and south west fringing reefs (OT.2) both recorded high soft coral cover (56.5%) and (42%) respectively.*

Graph C: *This graph presents the general distribution of live coral and dead/abiotic substrate cover found inside 6 monitoring stations for no-take areas and 6 monitoring sites outside of your conservation areas. Generally speaking, live coral cover in your no-take areas are currently lower than the dead coral and abiotic substrate (34% live coral and 66% dead, abiotic materials). On the other hand, live coral cover in the monitoring stations outside of no-take had healthy coral cover (57%). In general, live coral cover in your no-take areas is lower than your open access reefs.*

Population of fish indicator species inside no-take and at sites outside no-take







Summary of graphs A, B and C:

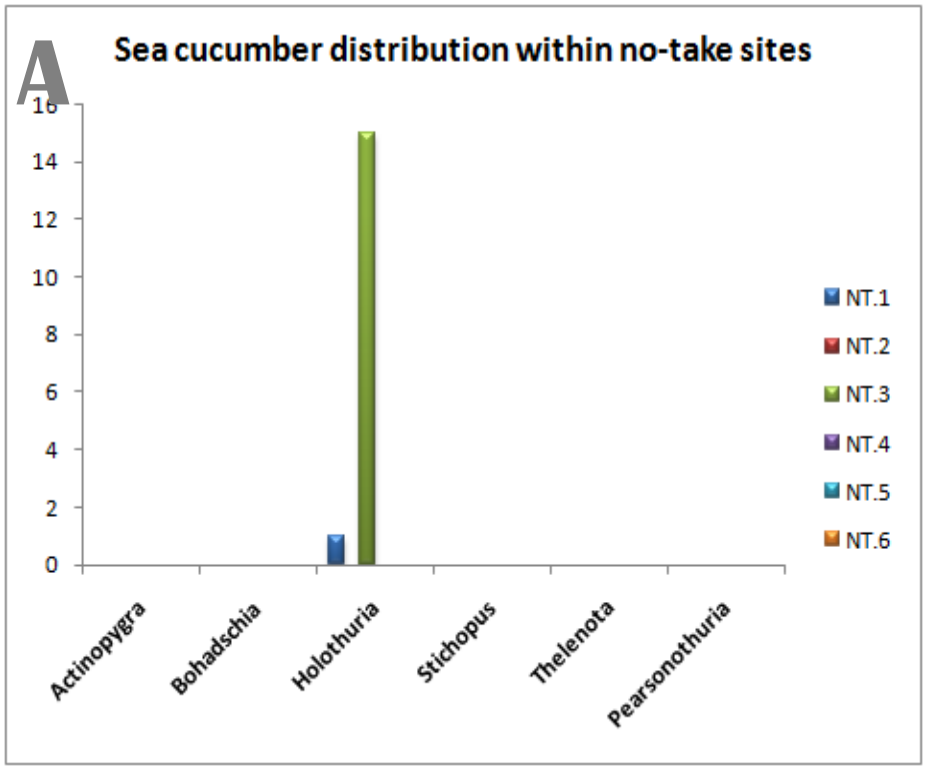
GRAPH A: *The first graph basically illustrate that monitoring stations at Luluwalagena (NT. 2), Siasialina (NT.4) and Banibani Siga (NT.6) all had high representation of herbivorous and carnivorous fishes. Average number of the two groupings was 14 herbivores, 14 carnivores at Luluwalagena, 11 herbivores and 12 carnivores at Siasialina and 11 herbivores and 12 carnivores per 500 square meters per sampling area. Tawali Namonamo (NT.1), Dana Gedu (NT.3) and Hanakubakuba (NT.5) all had medium to small aggregations in each of the areas no-take sites.*

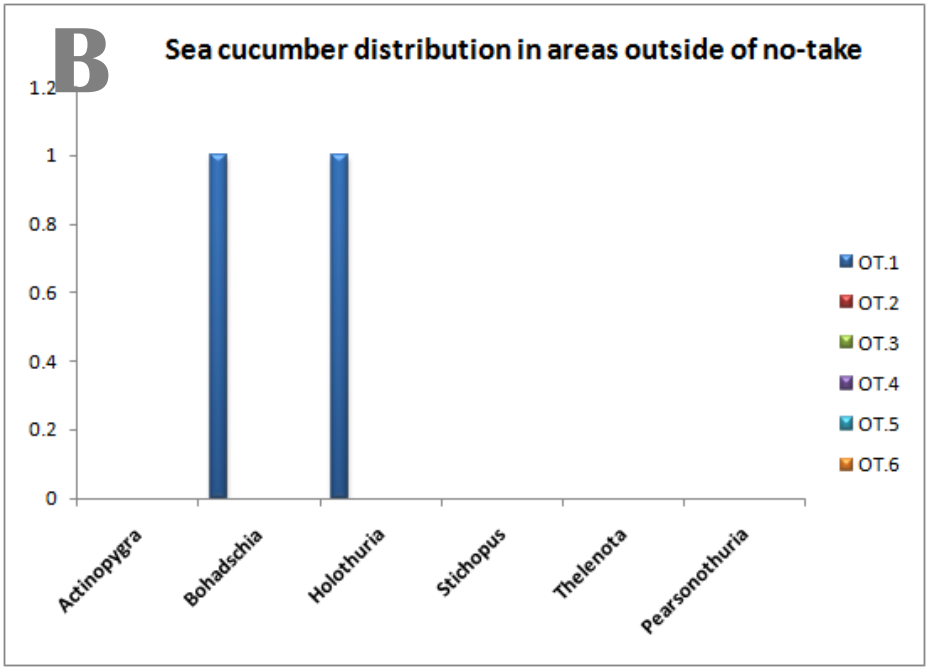
GRAPH B: *Population of herbivorous fishes was higher in most of the monitoring stations that were outside the no-take or conservation areas. Kiwakiwalina (OT. 6) recorded highest number of herbivores (mean of 44 fishes per 500m^2). Second site recording almost the same number was the fringing reef outside of Pahilele (OT.3) with average of 26 fish per 500m^2. Presence of carnivorous fishes like snappers, emperors, sweet lips were very low in numbers as indicated by their representatives used by our monitoring team.*

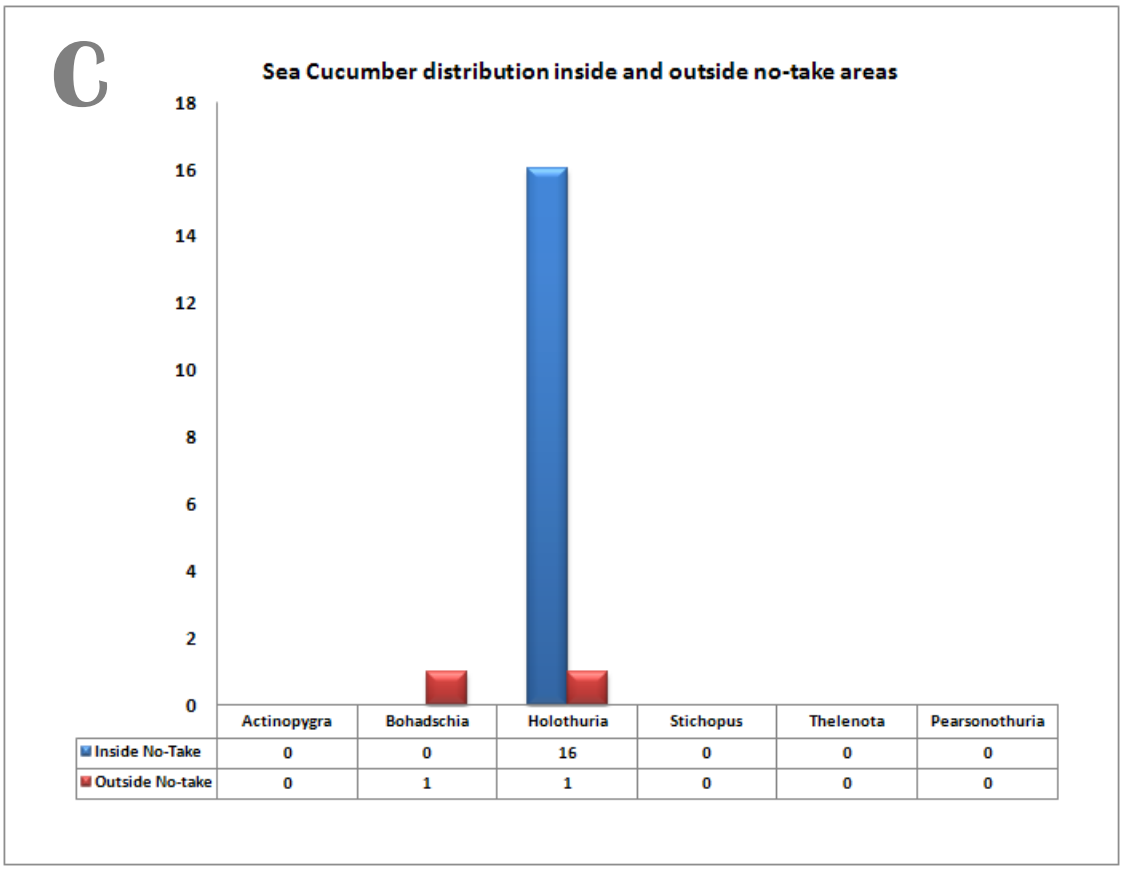
GRAPH C: *Looking at how much no-take areas has and how much areas outside of no-takes have we can now clearly see that there is a more abundance of carnivorous fishes in no-take (conservation area) than on reefs located outside of no-take. Population of herbivorous fishes was well represented in all sites located inside no-take as well as in sites locates outside of no-take. Also, when quantifying the 3 major fish groups we can say that on average, you are expected to record 9 carnivorous reef fishes in every 500m^2 and 12 herbivorous fish per 500m^2 of a reef. In the reefs sampled for areas outside of no-take, you would expect to record 2 carnivorous fish per 500m^2 and 15 herbivorous fish per 500m^2 of the transact. Records of endangered species like as the Maori Wrasse (IUCN Redlist Species) was recorded lowest in both no-take and reefs outside no-take.*

3.2. Marine Invertebrates

3.2.1. Sea cucumber population in no-take sites and in sites outside no-take





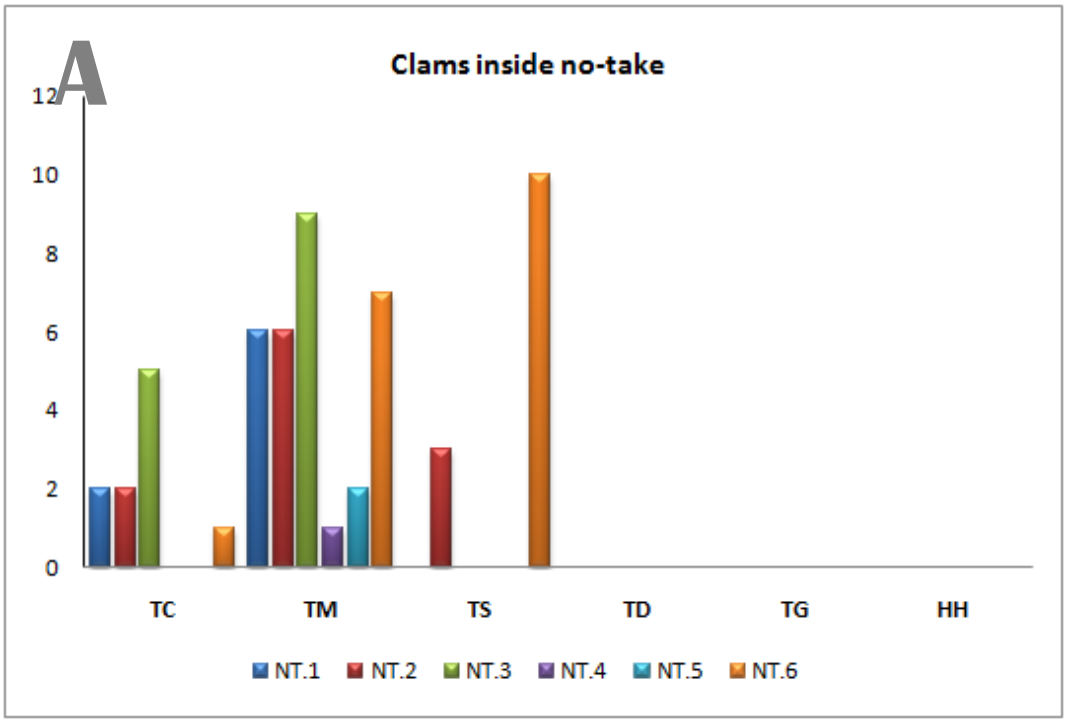


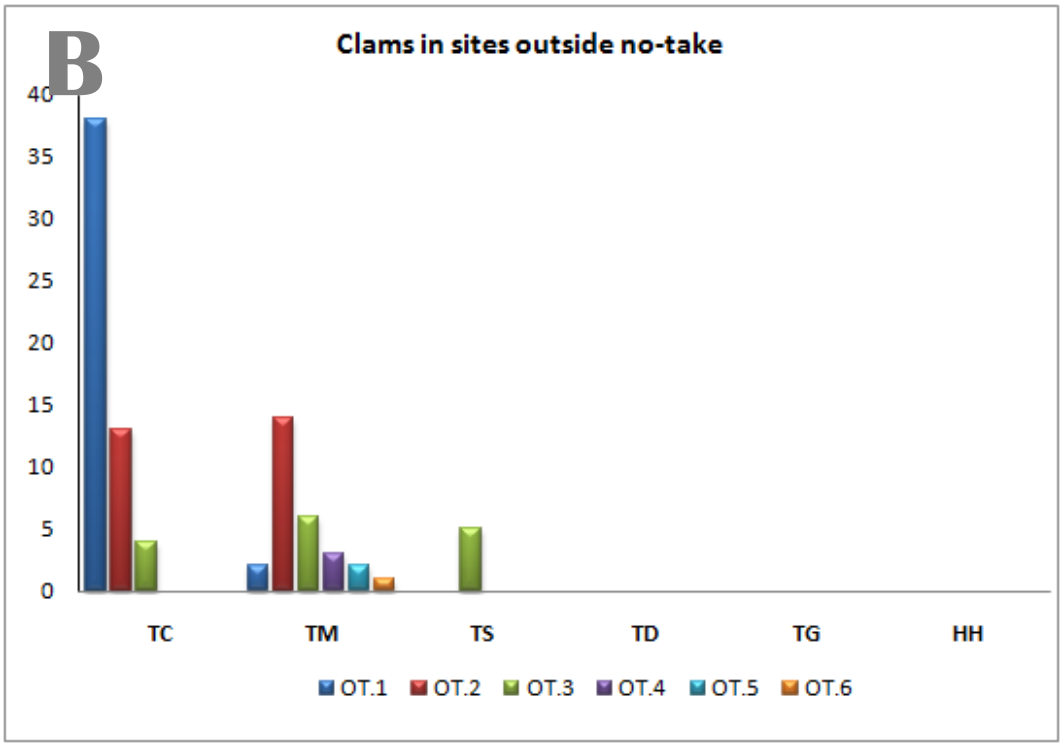
GRAPH A: *Summarizes the presence of the 6 major sea cucumber families in each of the 6 monitoring stations for Iabam-Pahilele CMMA. This graph shows that all sea cucumber species from the family Holothuria was recorded inside Dana Gedu (NT.3). Thus, there were 15 records for this family in the 500 square meter area of the transact. All other monitoring sites inside no-take sites did not have any Holothuria and other sea cucumber families except Tawali Namonamo which recorded only one species of Holothuria.*

GRAPH B: *Areas outside of the no-take that we also monitored showed presence of sea cucumber families (Bohadschia and Holothuria). Both sea cucumber families had 1 species each found inside the northwestern end of Iabam Island (OT. 1). All other areas assessed did not have any species or presence of any other sea cucumber.*

GRAPH C: *Sea cucumber from the family Holothuria was higher in the no-take sites than those outside no-take. There was also very little or 1 record for Holothuria and Bohadschia recorded in one site outside no-take.*

3.2.2. Distribution of giant clam inside no-take and in areas outside no-take





GRAPH A: *Distribution of giant clam inside no-take areas clearly illustrate that Tridacna squamosa (TS) was more abundant at Luluwalagena (NT.6) and Pahilele (NT.3). Tridacna maxima (TM) had high distribution in many no-take reefs. TM recorded its highest abundance in NT. 3 followed by NT.6 and NT. 1 and NT.2. Distribution and abundance of TC was recorded highest in NT.3 while all other areas had <2 individuals per 500m^2. There was no record for TG, TD and HH in any of the transacts surveyed.*

GRAPH B: *Clam data for monitoring sites outside no-take showed TC recording the highest abundance per 500 square meters in the fringing reef of Iabam Island (OT.1) while TM was recorded the most in the monitoring site southeast of Iabam Island (OT.2). Distribution of TS was lower in most*

OT sites however; OT.3 recorded 5 individuals inside the 500 square meter sampling area. TM was recorded in very low numbers for all other sites except OT.2. There was no record for TG, TD and HH.

3.2.3. Other marine invertebrates (lobster, sea starfish, trochus, crown-of-thorns)

Trochus shell was the only other marine organism that was found in both the no-take and outside the no-take monitoring stations. In the no-take 1 trochus shell was found at Banibani Siga (NT.6) and outside no-take, I individual was recorded at northwest Iabam (OT.1). All other invertebrates like lobster, starfish and crown of thorn starfish was not recorded in any monitoring stations.

4. DISCUSSION

4.1. Benthic substrate inside

Live coral cover inside sites that are under no-take management was found to be lower than dead, abiotic substrates. The lower percentage cover could be explained by the sites locality, exposure and isolation. Evidences presented by these reefs clearly demonstrated high levels of impacts by waves, storm surges and other prevalent conditions. Natural impacts on the reefs has somewhat created zonation and partition among coral reefs. Coral reef growth on reefs exposed to waves and surge conditions was different from those in sheltered lagoon and bays. At Siasialina, the upper reef flat comprised hard calcareous bedrock which supported isolated colonies of coral growth. Most live corals in the areas had survival capabilities to withstand these surge conditions. Thus, coral types found in the area comprised entirely of massive coral structures (MC), submassive coral (SMC), digitate coral (DC) and soft coral (SC) species. Having over 70% of abiotic substrate at Siasialina one cannot call this reef a degraded reef as it is still an important habitat for fish and other benthic organisms. A totally degraded reef system would be one that once had high coral cover and have been shredded to rubble and other particles. Thus, when a reef condition is reduced from a healthy system then this reef could be seen as a degraded and/or reef system that is undergoing immense stress.
When we take a closer look at what out data provides for Siasialina, we find that the portion of the reef sampled contained 71.5% dead, abiotic substrate while live corals was 28.5%. Inside the 71.5%, dead coral rubble and bedrock substrate were the two dominating substrates comprising (34%) and (19.5%) each. There were also other substrate materials like branched corals (10.5%), table coral (10%) and massive corals (2.5%), all presented within the study area. Others monitoring sites and/or reefs with similar substrate distribution pattern could be explained in a similar manner.

Many monitoring sites outside of the no-take areas are located on the islands fringing reefs (OT.1, OT.2 & OT.3) as well as on patch and barrier reefs closer to Iabam and Pahilele Islands. Live coral cover in these areas was much higher than any other sites in the no-take. Thus, species distribution was also high in comparison to sites inside no-take. A clear indication of these differences was the high records of soft corals. Sites OT.1 and OT.2 each had very cover of 56.5% and 42% respectively. Branched coral was also the highest at Tawali Balabala (72.5%) of the sampled transact. ***(All explanations illustrated in the diagram below)***

4.2. Reef Fish

Fish population for indicator species inside Iabam and Pahilele Islands showed equal representations for herbivore and carnivore indicators. On average, Luluwalagena (NT.2), Siasialina (NT.4) and Banibani Siga (NT.6) had remarkable fish populations. Reef fish population for both herbivores and carnivores indicates low fishing pressure by the two island communities. An interesting finding from deepwater fish survey was on fish size classes. Many predatory or carnivorous fishes that were expected to be large in size were however small. Fish species like leopard grouper (*Plectropomus leopardus*), four saddle grouper (*P. laevis*) and sweet lips like (*Plecorhinchus chaetodontoides*) grow up to large size individuals as they past maturity however; many showed reduced growth sizes. Thus, on average many were recorded to be between (35-40 cm) size classes. Population distribution and size classes for herbivorous fishes are in a very good state at this moment. There were a lot of surgeonfishes recorded on the very shallow fringing and barrier reefs indicating that fishing pressure on this fish is still low. Moreover; there were many very large individuals and groups of parrotfishes like the Bumphead parrotfish (*Bolbometapon muticatum*), steephead parrotfish *(Chlorurus bleekeri),* Bicolor parrotfish (*Cetoscarus bicolor*) Pacific steephead parrotfish (*Chlorurus microrhinos*), Pacific longnose parrotfish (*Hipposcarus longiceps*) and countless numbers of smaller species like Bullethead parrotfish (*C. sordidus*), (*Scarus dimidiatus*), Swarthy parrotfish (*S. niger*) and Dark-capperd parrotfish (*S. oviceps*) found in all shallow and deepwater habitats.

Pelagic fishes like tuna, mackerel and travaly were not considered in this community based monitoring program however; were considered important food fish and their sightings were recorded in the deepwater transacts.

4.3. Sea Cucumber

Numbers on sea cucumber in all sites inside and outside no-take is still very low. Results from the fist survey and the second survey both illustrate that recovery is happening at a very slow phase which only long term monitoring trend can tell us the different changes happening in the near future.

4.4. Clam Shell

Most common clam shells inside Iabam and Pahilele fringing reefs and offshore reefs are *Tridacna maxima* (TM) followed by *T. crocea* (TC) and *T. squamosa* (TS). In this survey, the monitoring stations did not record any *Hippopus hippopus* (HH) in both no-take and outside no-take. *T. gigas* (TG) and *T. dearsa* (TD). Both TG and TD did not have any records inside no-take however; there were records of some sightings of some outside individual species outside transacts in the monitoring stations.

One major field problem faced by the monitoring team is the ability to distinguish between T. maxima (TM) and T. squamosa (TS) in the wild. I have observed a lot of misidentification by the Nuakata team, recording TS instead of TM. I will further provide technical assistance, training and capacity building to facilitate this so that the same problem should not be repeated in the next monitoring.

4.5. Other invertebrates *(Lobster, trochus, crown of thorn starfish & starfish)*

No individual presence of other invertebrates inside conservation areas (No-Take) and outside no-take except for 1 species of trochus shell that was found inside NT.6 and in the site outside no-take, site OT. 1.

Management Consideration for Iabam-Pahilele Community

SUCH FISHING PRACTISES WILL HAVE LONG TERM CONSEQUENCES ON YOUR RESOURCES.

THE CHOICE IS YOURS TO DECIDE

5. REFERENCE

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